# EIELSON AFB FIRE SYSTEMS STANDARDS
# 354TH CIVIL ENGINEER SQUADRON
# ALARM MAINTENANCE SHOP

## 1. FIRE ALARM PANELS:

### A. INTELLIGENT FIRE ALARM PANELS (ADDRESSABLE):

**An Intelligent type fire panel is required for facilities that have five rooms or more.** The Intelligent fire panel is also strongly encouraged for facilities with less than five rooms for its supervisory quality, troubleshooting ease, and information provided for responding fire fighters. Point to Point reporting is the required programming type of the addressable panel such as a MAAP+ panel, MAAP-X panel from Monaco. This is to get the point to point reporting back to the D-21 system at fire dispatch. The panel selected shall have at minimum two Signaling Loop Circuits (SLC). A failure of one SLC shall not cause a facility to lose over 50% of its detection capability. All newly installed panels must be able to communicate with the Monaco Fire alarm receiving station at the Fire Department by radio signal. The Radio transmitters must be compliant with Item #3.

### B. CONVENTIONAL FIRE PANEL:

The traditional multi-zone fire alarm panel is fine for small buildings of four rooms or less, such as a 40' x 80' storage warehouse. However, do not lump all initiating devices (heat detectors, pull stations, etc.) into a single zone. A single zone facility is unacceptable to the Fire Department and Alarm Maintenance technicians. A failure of one zone shall not cause a facility to lose over 50% of its detection capability. The acceptable manufacturers are Simplex, Pyrotronics, and Monaco. All newly installed panels must be able to communicate with the Monaco Fire alarm receiving station at the Fire Department by radio signal. The Radio transmitters must be compliant with section #3.

### C. REQUIEMENTS INCLUDING CODE FOR INSTALLATION OF FIRE PANELS AND SYSTEMS:

**1.** The fire panel shall have a dedicated branch circuit to power it and its disconnecting means shall be permanently identified inside the fire alarm control panel. The disconnecting means (Circuit Breaker) shall be identified as "FIRE ALARM CIRCUIT" on the panel. The disconnecting means handle or tab shall be red for visual identification. These requirements are all per NFPA 72 10.5.5.2-10.5.5.3.

**2.** For system maintenance, reprogramming, and testing a copy of all documentation and equipment relevant to the fire alarm panel or system shall be turned over to the Fire

alarm Shop (907)377-6666. This is to include per code 14.2.4.1, and 14.2.4.2 of NFPA 72 a copy of the program, all programing software and interface equipment for both the fire alarm panel and all fire system devices requiring programing even if proprietary this is to include operating software keys. The revisions of the fire alarm software, and the revisions of the software in the systems with which the fire alarm software interfaces, shall be verified for compatibility in accordance with the requirements of 23.2.2.1.1.

**3.** All conduits for Fire alarm systems shall be red. If not possible than all conduits shall be marked every 10 ft. and all junction or connections boxes or points shall be marked red.

**4.** There shall be a smoke detector installed above the Fire alarm control panel per code unless panel is installed in artic entryway, then a fixed temp heat detector shall be installed instead.

**5.** All Standby or backup batteries shall be installed if allowed in the fire alarm panel, or a manufacture list battery panel. There shall be enough room so that batteries can be properly place in cabinet on their base not side or ends.

**6.** All fire alarm systems components including sprinkler system control valve shall be supervised and continuously monitored for troubles.

**7.** All fire alarm panels must include ability to override HVAC system and shut it down in fire emergency. This override ability must cause the panel to go into a trouble condition in the out of normal state.

**8.** Where addressable modules are used on conventional devices reporting back to panel, it shall be a one for one attachment. This being that each addressable initiating device module shall monitor, at most, one conventional initiating device.

**9.** Contractor shall include a disable switch or function for the following items (located at the main fire alarm control panel): [air handler fan shutdown and smoke damper closure, horns (speakers for combined systems), strobes, automatic door hold open release, elevator recall, elevator shunt trip, fire pump, exit sign flash, etc.] If a disable switch or feature is activated, an LED will illuminate at the panel indicating a trouble condition, a trouble signal shall be transmitted to the fire department and a description of the feature disabled displayed at the fire alarm panel.

**10.** The fire alarm system wiring shall be Class A or X. Provide 1 foot vertical and 4 foot horizontal separation between outgoing and return raceways of looped circuits. Separation is not required for the first 10 feet of raceway to/from an individual device. Separation is not required for loops to multiple devices installed in rooms 1000 square feet and smaller.

**11.** All conductor connections shall be made under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited.

**12.** Any add-ons to the fire panel, such as exit lights that flash during alarm, must meet fire alarm panel manufacturer's compatibility requirements.

**13.** All Spare keys will be turned into the Alarm Maintenance Shop. We recommend that the fire panel and all device panels are of a common type such as C415A, T45, or B type.

**14.** A surge protector shall be installed in each Fire Alarm system to prevent power surges from burning sensitive electronic parts.

**15.** In addition to information listed above all panels must be installed per NFPA 72 and UFC 3-600-01.

**16.** All Fire Panels and devices shall be terminated by either a NICET level III technician or an individual licensed by the State of Alaska for fire alarm systems installation (Class IC). Proof of qualifications shall be submitted on request.

## D. FIRE PANEL REPORTING:

The Contractor is responsible for programming all front end devices and getting a list of their zone or device setup to the Fire Alarm Shop so that it can be programmed into the D-21 for that facility. The fire alarm panel or transceiver shall transmit all addressable devices or at minimum the following zones in order:

1. Water flow alarm (1 per water flow switch)
2. Manual Pull Station (1 per floor)
3. Automatic detector initiating building alarm (1 per floor per device type)
4. Dwelling unit heat detector alarm signal (1 per floor)
5. Dwelling unit smoke detector supervisory signal (1 per floor)
6. Tamper Switch trouble signal
7. Low Temperature supervisory signal for mechanical rooms
8. Duct Detector alarm signal (1 per floor)
9. Mass Notification override of the fire alarm notification system supervisory signal
10. General supervisory signal

**11.** Common Trouble signal

**12.** Two spare zones, including necessary relays and hardware in the fire alarm panel and transmitter panel.

## 2. REMOTE ANNUNCIATOR:

**A.** We recommend locating the fire alarm panel near the main entrance to the building. If this is not possible than an annunciator must be located at the entrance. We require a Textural annunciator panel if possible for fire alarm panel that is compatible with that type of fire panel.

**B.** The annunciators must have both a silence and reset button, and provide the same LCD message display as the fire panel. Any annunciator included in building specifications must be 100% compatible with the fire alarm panel. Some of the existing annunciator's on base indicate pointless system troubles that are a waste of time and resources, due to not being compatible.

## 3. RADIO TRANSMITTER / ANTENNA:

**A.** Fire alarm transmitters must be Monaco D2100 compatible. The current frequency is 139.675 MHz narrowband. The Monaco BT -XM transmitter is required if fire panel being installed is a panel other than a Monaco. Monaco M-series fire alarm panels have a radio transmitter built-in helping to reducing cost. The contract should specify that the contractor is responsible for programming the transmitter as well as the fire alarm panel. The Alarm Maintenance shop can be contacted at 907-377-6666 to provide the transmitter numbers from the Monaco D2100 for the contractor.

**B.** The antenna must be mounted on the gable end of the building (closest to the Fire Department) when there is a pitched roof to prevent damage from ice buildup. The grounding wire cannot be attached to any fixed ladders. The antenna shall be mounted a minimum of 2' above the roof line and must be mounted securely (nut and bolt) to withstand the wind load. Mounting the bracket using screws through the building's metal skin is not acceptable. The contractor is responsible for cutting the antenna to its proper length, in order to match the frequency and transmit correctly, and is responsible for installing the antenna cable connectors correctly. The antenna cable must have a lightning arrester installed inline, in a weatherproof box. The assembly must be properly grounded per manufacturer specifications.

**C.** As part of the 100% functional acceptance test, witnessed by Alarm Maintenance, the transmitter must pass manufacturer's specifications for forward and reflective power, and all signals transmitted to the Fire Department must be accurate.

# 4. INTIATION DEVICES:

## A. HEAT DETECTORS:

**1.** We require the use of fixed type temperature heat detectors, unless otherwise required by code. Rate of rise type detectors cause repeated nuisance alarms for the fire department due to the arctic temperatures.

**2.** Make sure to install heat detectors per code. At normal ceiling height below 10' a heat detectors shall not be placed any more than 50' apart and 25' from the wall unless manufacture calls for different spacing.

## B. SMOKE DETECTORS:

**1.** Detectors located in Dormitory sleeping areas should have smoke detectors that sound locally, and heat detectors that put the whole system in alarm. In Dormitory activation of a single dwelling unit smoke detector shall transmit a supervisory signal to the Fire Department. In Dormitory Activation of any two dwelling unit smoke detectors shall activate all fire alarm occupant notification appliances within the facility.

**2.** Fire/smoke doors in egress path shall be held open by magnetic devices controlled by the fire alarm panel. Smoke detectors shall be provided at all doors held open by magnetic hold open device, regardless of door type.

3. Location of smoke detectors shall comply with the NFPA 72. Per code Smoke detectors shall be place no farther apart than 30' and they shall be placed within 15' of all walls. This can vary depending on ceiling style and angle.

## C. DUCT DETECTORS:

**1.** All duct detectors that are installed must be easily accessible and clearly labeled. Climbing over ductwork or needing a ladder over 8' for access is unacceptable.

**2.** Any duct detectors over 10' from the floor will have a remote LED/test/reset device easily accessible to a person standing on the floor that is labeled for the duct detector that it is associated with.

**3.** All duct detectors shall be of the auto reset type. If this is not possible than a remote LED/test/reset device needs to be easily accessible to reset the detector manually.

## D. PULL STATION:

Provide pull stations where required by applicable codes and criteria. At a minimum, a pull station shall be located with 5 feet of each exit. Fire alarm system pull stations shall be non-glass break type and shall require a key to reset. Do not use pull stations with a Tamper

glass rod installed in them unless specifically requested for that job by Fire Department, or Fire Alarm Shop.

**E. LOW TEMPERATURE SENSORS:**

Mechanical rooms that sprinkler risers are located in are required to have a low temperature sensor in them to prevent freeze ups. Upon activation of the low temperature alarm, a supervisory signal shall be sent to the Fire Department.

**F. ELEVATOR CONTROLS:**

The fire alarm control panel shall provide smoke detection, flow switches, and supervised addressable relays for elevator functions as required by UFC 3-600-01. Control system for elevator must be wired up and programmed by contractor if required.

**G. LABELING:**

A device label shall be provided on the exterior of each device that matches the devices number for Addressable fire panels or zone number for Conventional devices.

## 5. ALARM ANNUNCIATION:

**A.** All Annunciation devices shall be of the Horn Strobe type except on the exterior of the building unless otherwise authorized by Fire Department or Fire Alarm Shop. The devices on exterior of building can be bells installed in weatherproof enclosures.

**B.** A weatherproof bell or horn/strobe shall be installed on each side of the exterior of the building.

**C.** Strobes shall be provided to alert persons with hearing disabilities and shall be installed per NFPA 72 and located as required to meet ADA-ABA and UFAS requirements. Wall-mounted appliances shall be mounted such that the entire lens is not less than 80 inches above the highest floor level or 6 inches below the ceiling, whichever is lower. Ceiling strobes are permitted and shall be located and installed per NFPA 72 and may be part of a combined audible/visual device. Amber strobes shall be provided for the mass notification system and clear strobes shall be provided for the fire alarm system. [Mass notification and fire alarm visual appliances shall be provided in dwelling units.]

**D.** Contractor shall provide sound pressure and light level calculations at the final design submittal or as a Government Approved submittal after design. As a minimum, provide the following for each room and space: ambient sound pressure level (SPL) including contributions from equipment, maximum and minimum intelligibility, maximum and minimum strobe light level and maximum and minimum alarm SPL.

## 6. SPRINKLER/SUPPRESSION SYSTEMS:

**A**. New installs under the terms of UFC 3-600-01, shall be considered major projects, and requires the services of a fire protection engineer. At the initial design conference, or at another time convenient to all parties prior to final design submission, the fire protection engineer shall meet with the Eielson Fire Alarm shop and Fire Department personnel to review all the fire protection aspects of the design.

**B.** Inspector's test valve is to be located at the farthest point of the suppression system.

**C.** All open bay area's or area's where freezing is probable required a dry pipe system for suppression. A low air pressure switch is mandatory for a dry system, and must be address or zoned independently.

**D.** If a wet pipe system is utilized, ensure a time-delay programming for the flow switch installed to counter any water pressure instability. Any area that is susceptible to arctic temperature requires self-regulating heat tape and insulation.

**E.** Communication centers must follow UFC 3-600-01 and or NFPA requirements and have a sprinkler suppression system. This system should not use any type of water suppression; they should use an Air Force Approved Alternate suppression system if possible. Contact Fire Department, or Fire Alarm shop for current expectable systems or for waiver of this requirement.

**F.** The recommended tamper switch is a plug and cord type. Potter PTS-B or similar device is preferred. This type of switch will help to prevent nuisance alarms. All tamper switches need to be addressed individually (intelligent system). Each valve of the double backflow preventers in a suppression system requires a tamper switch.

**G.** All Materials and Equipment shall have been tested by Underwriters Laboratories, Inc. and listed in UL Fire Prot Dir or approved by FM Global for the intended use.

**H.** Hydraulic calculations shall take into account the domestic water demand in addition to the fire sprinkler and hose stream demand. All calculations shall include a 10 percent safety factor on the system pressure. Water velocity in the piping system shall not exceed 20 feet per second. Software that uses k-factors for typical branch lines is not acceptable.

**I.** All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP.

**J.** Provide manual air vents and/or auxiliary drains to allow bleeding of air from all the sprinkler piping.

**K.** Sprinkler pipe shall not be located in the communications room or elevator machine room. Sprinklers protecting the communications room or elevator machine rooms shall be sidewall type and provided with a guard.

**L.** Sprinklers shall be provided to protect all floor areas under the first floor stair including landings and risers.

**M.** Hydrant flow shall be re-tested prior to design work on the sprinkler system to obtain the flow quantities. Fire Protection Engineer Designer of Record is required to witness flow tests.

**N.** Fittings for non-grooved steel pipe shall be malleable iron conforming to ASME B16.3. Fittings into which sprinklers, drop nipples or riser nipples (sprigs) are screwed shall be threaded type. Plain-end fittings with mechanical couplings, fittings that use steel gripping devices to bite into the pipe and segmented welded fittings shall not be used. Gasket for grooved couplings shall be the flush type that fills the entire cavity between the fitting and the pipe. Reductions in pipe sizes shall be made with one-piece tapered reducing fittings.

**O.** Water motor alarms shall not be used. All sprinkler system alarms shall be electrically powered and controlled by the fire alarm panel.

**P.** Contractor shall provide a floor control valve assembly or separate riser for each floor in the building. Assembly shall comply with Figure 4-1 of UFC 3-600-01.

**Q.** Plastic pipe is prohibited.

**R.** Flexible hose connections for sprinklers are prohibited.

**S.** Control valves shall be installed in a location accessible by maintenance personnel and inaccessible to building occupants.

**T.** A double-check backflow prevention assembly that complies with ASSE 1013 or ASSE 1015 shall be provided at the sprinkler riser connection to the potable water system. Provide piping, valves, test header, and other devices necessary to provide a permanent method for forward flow testing of the backflow prevention assembly at system demand. Forward flow test shall not require removal of check valve disk. If a reduced pressure backflow preventer is provided, the disinfection requirements located elsewhere are not required. Vent from the reduced pressure backflow preventer shall be provided with drain piping to an adequately sized floor drain. Prior to final sprinkler testing, the backflow preventer shall be tested by a certified backflow assembly tester. Backflow preventer testing documentation will need to be supplied to Utilities Shop Supervisor. (Sheldon Sites.)

**U.** Barracks only: Flushed concealed sprinkler heads shall be provided in the dwelling units and the corridors located outside the dwelling units.

**V.** If an elevator pit sprinkler is provided, a flow switch shall be provided in the same location as the pit sprinkler control valve.

**W.** All piping used on the fire suppression system shall be black steel.

## 7. MASS NOTIFICATION SYSTEM:

**A.** In-facility Mass Notification systems shall be installed in all DoD inhabited buildings, billeting, and high occupancy family housing, and to all DoD expeditionary structures in accordance with the following:

1. New construction regardless of funding source.

2. Existing Buildings when triggered as specified below regardless of funding source.

   a. Implementation of these standards to bring entire inhabited buildings into compliance is mandatory for all DoD buildings renovations, modification, repairs, revitalizations, and restorations where those costs exceed 50% of the buildings replacement value of the existing building in accordance with UFC 3-701-01 based on a building of the same size except as otherwise stated in these standards.

3. For additional reference on facilities needing Mass Notification reference UFC 4-010-01, and 4-021-01.

**B.** The acceptable manufacturer for the Mass Notification is Cooper Wheelock, with the unit being a SP40 or equivalent model.

**C.** If a Mass Notification system is installed a Monaco BT-XM transceiver must also be installed and wired so that Remote live voice and remote buttons functions can be used from the Fire Dispatch center. If a Monaco BT-XM is already installed for the facility, then you may just to add an additional zone and wire in the controls

**D.** Contractor is responsible for all programing of the BT-XM and Mass Notification system, Fire Alarm Shop will assist with the programing of the D-21. For more information reference area #3 of this paper or contact the Fire Alarm Shop at 907-377-6666.

**E.** A surge protector shall be installed in each Mass Notification system to prevent power surges from burning sensitive electronic parts.

**F.** Contractor shall provide sound pressure and light level calculations at the final design submittal or as a Government Approved submittal after design. As a minimum, provide the

following for each room and space: ambient sound pressure level (SPL) including contributions from equipment, maximum and minimum intelligibility, maximum and minimum strobe light level and maximum and minimum alarm SPL.

**G.** The Mass Notification system and the fire alarm system shall be wired independent of each other especially speaker. The only exception is for the monitor wiring, and the relay to silence the horns while making an announcement. When announcement is finished the fire alarm horns should continue ringing automatically if fire system was going off.

**H.** Design criteria for locating audible appliances. The sound pressure level in a room or area shall not vary by more than 6 dB across the room or area (starting at a point 10 feet from the speaker or horn).

**I.** Voice notification appliances shall have adjustable or multi-tap settings with available settings both above and below the design settings (except that 15 watt devices, where permitted, can be at the highest setting). Devices shall be spaced such that the device does not need to be tapped higher than 0.5 watt to meet audibility and intelligibility requirements.

**J.** Amplifier circuits shall be loaded to no more than 70 percent of rated continuous capacity when producing sound levels as required by NFPA 72 against normal ambient background noise levels for this occupancy for simultaneous operation of all speakers for all areas in the voice zone. Annotate data for each circuit on the drawing.

**K.** Mass notification system panels and devices shall be terminated by either a NICET level III technician or an individual licensed by the State of Alaska for fire alarm system installation (Class IC). Proof of qualifications shall be submitted if requested.

**L.** Mass notification system and speakers shall have power source and backup power source separate from Fire Alarm system.

**M.** All Local Operator Consoles (LOC) are required to have an adjustable microphone gain.

**N.** Contractor shall provide instructions located inside the LOC cabinet and at the ACU describing the procedures for initiating either live voice messages or pre-recorded messages. These instructions shall be permanently attached to the cabinet.

**O.** LOC microphones shall be located and adjusted so that the microphones can be used to provide a message meeting the intelligibility requirements of UFC 4-021-01. LOC's may be located in the stairs; however travel distance defined in UFC 4-021-01 must still be met. If LOC's are provided in the stairs, Contractor shall provide an amber strobe at each floor landing in the stairs.

**P.** LOC enclosures shall be lockable by a key. All extra LOC enclosure and activation Keys shall be turned into the Fire Alarm Shop.

**Q. The LOC shall be capable of a minimum of 8 pre-recorded messages.** The following pre-recorded messages shall be programmed into and clearly labeled on the LOC's:

**1. Attention all personnel:** There has been a bomb threat**.** Evacuate immediately and proceed to your designated evacuation point. This is not a drill.

**2. Attention all personnel:** Lockdown, lockdown, lockdown. There is an active shooter on the premises. This is not a drill.

**3. Attention all personnel:** Please evacuate the building immediately. Listen for announcement of alternate exit path if required. This is not a drill.

**4. Attention all personnel:** There is a fire in the building. Stay low and evacuate immediately. Proceed to your designated evacuation point. This is not a drill.

**5. Attention all personnel:** Please proceed to your designated shelter-in-place room immediately and wait for further instruction. This is not a drill.

**6. Attention all personnel:** This is a severe weather warning. Make sure to keep track of weather conditions and be prepared to take shelter.

**7. Attention all personnel:** The building emergency or test has now ended. Please resume your normal duties. Thank you for your cooperation.

**8. Attention all personnel:** This is a test of the Mass Notification system. This is only a test.

## 8. TRAINING MANUALS AND INSPECTIONS:

### A. FIRE ALARM TRAINING:

**1.** Fire Alarm Training. Training course shall be provided for Alarm Shop personnel. The course shall be conducted in the building where the system is installed or as designated by the Contracting Officer. The training shall consist of two [2]-hour training sessions held on consecutive days with one training session per day, unless otherwise setup with the shop. The training shall start after the system is functionally completed but prior to final acceptance tests. The instruction shall cover items contained in the operation and maintenance instructions. The contractor shall provide all required training material, visual aids, software/hardware to supply the number of personnel to be trained in each training session.

**2.** Sprinkler System Training. Training course shall be provided for Alarm Shop personnel. The course shall be conducted in the building where the system is installed. The training shall consist of a two hour training sessions. The training shall start after the system is functionally complete.

**3.** Mass Notification Training. Training course shall be provided for Alarm Shop personnel. The course shall be conducted in the building where the system is installed. The training shall consist of a two hour training sessions. The training shall start after the system is functionally complete.

**4.** All blueprints and as-builds related to the fire alarm and suppression systems need to be forwarded to Alarm Shop 48 hours prior to the 100% acceptance test. As-build drawing must show the location and address or zone of each device in the system. Intelligent devices must be labeled with their address.

**5.** Two suitably framed drawings are required in the suppression room: one drawing showing all interconnections of suppression components, and one drawing listing the sequence of operation for testing, and resetting after a system trip.

**6.** Sprinkler System Testing. The system, including the underground water mains, and the aboveground piping and system components, shall be tested in accordance with NFPA 13 and NFPA 24 to assure that equipment and components function as intended. Upon completion of specified tests, the Contractor shall complete and submit the Contractor's Material and Test Certificates. The Contractor shall coordinate with the Contracting Officer's Representative to invite Fire Alarm Shop personnel and Fire Department personnel to witness final testing. Final testing schedule shall be flexible to accommodate Fire Alarm Shop schedule.

**7.** Fire Alarm & Mass Notification Testing. The fire alarm and mass notification systems shall be fully tested with a functional and operational performance tests including each installed initiating and notification device, meggering of conductors for grounded, shorted or open circuits. An acceptance test shall be performed in accordance with NFPA 72. Each device shall be tested. After testing is completed, the Contractor s hall furnish to the Contracting Officers Representative completed originals of the NFPA 72 Record of Completion and the NFPA 72 Testing and Inspection form. The Contractor shall coordinate with the Contracting Officer's Representative to invite Fire Alarm Shop personnel and Fire Department personnel to witness final testing. Final testing schedule shall be flexible to accommodate Fire Alarm Shop schedule.

**8.** Contractor Mass Notification Final Test. Audibility and intelligibility testing of the mass notification system shall be accomplished in accordance with UFC 4-021-01. UFC 4-021-01 requires an average of 3 readings of each room to determine the CIS score. The 3 readings will be taken as follows: the most remote point from the speakers in the room; a middle point between speakers to be field determined based on wall or ceiling mounted speakers; and a point close to the speaker. Readings will be recorded on an 11x17 plan of the building with CIS scores identified on the drawings.

**9.** Copies of all systems manuals need to be turned over to the Fire Alarm Shop when building is complete.

## 9. WARRANTY COVERAGE:

Include in the warranty statement that any code violations not discovered during acceptance testing, but found during the warranty period, will be corrected by the contractor. The 1 year warranty should begin when the entire facility is signed off, not when the fire alarm portion of the project is complete. (Contact the Alarm Maintenance Shop for further clarification if needed).

## 10. ALARM SHOP SUPPORT:

In the event that a contractor requires 354 CES Alarms shop support for the performance of duties as outlined in a contract or is doing work on a fire system, the contractor must coordinate with the Alarm Shop Supervisor/NCOIC, 24 to 72 hours in advance for scheduling purposes.